

INFORMATION SHEET

ORDER NO.
LAKE BERRYESSA RESORT IMPROVEMENT DISTRICT
WASTEWATER TREATMENT FACILITY
NAPA COUNTY

Background

The Lake Berryessa Resort Improvement District's wastewater treatment facility is located along the northwestern shoreline of Lake Berryessa near Putah Creek in Napa County. The WWTF currently treats and disposes of wastewater from 187 existing single family dwellings at the Berryessa Estates Subdivision. A total of 339 service connections are available at full buildout. Lake Berryessa Resort Improvement District's previous Waste Discharge Requirements (WDRs) Order No. 95-171 prescribes requirements for the treatment discharge of up to 35,000 gallons per day of wastewater to five evaporation/percolation ponds. However, because these WDRs do not reflect the two additional wastewater ponds and three land application areas necessary to treat and dispose of the wastewater, updated WDRs are necessary.

Wastewater from the Berryessa Estates Subdivision flows via gravity to three lift stations where it is pumped to a 91,000-gallon aboveground holding tank and a 21,000-gallon overflow tank. From the tanks, the wastewater is pumped approximately 1.2 miles through a six-inch diameter force main into a manhole. The flow meter is located within the force main. From the manhole, wastewater gravity flows to a manually operated distribution box and to three treatment ponds (Pond Nos. 1 through 3) that are connected in series. From Pond No. 3, wastewater gravity flows to Pond No. 4 and then to Pond No. 5. A portable effluent pump is used to transfer wastewater from either Pond Nos. 4 or 5 to Pond No. 6. A portable effluent pump is also used to transfer wastewater from Pond No. 6 to Pond No. 7.

The wastewater in Pond No. 7 will be disinfected using calcium hypochlorite tablets to maintain a chlorine residual of no less than 0.3 mg/L and total coliform organism concentrations of less than 23 MPN/100 mL prior to being discharged to one of three land application areas totaling six acres via a spray irrigation system. The wastewater in Pond No. 7 is tested on a daily basis for chlorine residual using a handheld meter and samples for fecal and total coliform organisms are collected on a weekly basis or when the chlorine residual of the wastewater in Pond No. 7 is at least 0.3 mg/L. Disinfected wastewater is applied to the land application areas when the total coliform concentrations are less than 23 MPN/100 mL. If the total coliform organism concentrations are above 23 MPN/100 mL then the chlorine dose to the pond is increased and no wastewater is applied to the land application areas. This Order requires that if this proposed plan does not ensure continued compliance with the effluent limits the chlorination process must be updated.

Initially, the monthly average inflow to the WWTP shall not exceed an average monthly dry weather flow (ADWF) of 42,000 gpd. However, the monthly average dry weather inflow to the WWTP may be increased to 67,000 gpd if the Discharger submits a technical report as required by Provision G.1.a of the Order that justifies the increase and is approved by the Executive Officer.

Sludge will be allowed to accumulate in the treatment and storage ponds and will be removed on an as needed basis to maintain pond capacity and treatment effectiveness.

Basin Plan, Beneficial Uses, and Regulatory Considerations

Surface water drainage from the site is to Stone Corral Creek, which flows in to Putah Creek and is a tributary to Lake Berryessa. The *Water Quality Control Plan for the California Regional Water Quality Control Board Central Valley Region, Fourth Edition* (Basin Plan), designates beneficial uses, establishes water quality objectives, and contains implementation plans and policies for all waters of the Basin. Beneficial uses often determine the water quality objectives that apply to a water body. For example, waters designated as municipal and domestic supply must meet the maximum contaminant levels (MCLs) for drinking waters. The Basin Plan sets forth the applicable beneficial uses (industrial, agricultural, and domestic and municipal supply in this instance) of groundwater, procedure for application of water quality objectives, and the process for and factors to consider in allocating waste assimilation capacity.

Antidegradation

The antidegradation directives of State Water Board Resolution No. 68-16, "Statement of Policy With Respect to Maintaining High Quality Waters in California," or "Antidegradation Policy" require that waters of the State that are better in quality than established water quality objectives be maintained "consistent with the maximum benefit to the people of the State." Waters can be of high quality for some constituents or beneficial uses and not others. Policies and procedures for complying with this directive are set forth in the Basin Plan.

Resolution 68-16 is applied on a case-by-case, constituent-by-constituent basis in determining whether a certain degree of degradation can be justified. It is incumbent upon the Discharger to provide technical information for the Regional Water Board to evaluate that fully characterizes:

- All waste constituents to be discharged;
- The background water quality of the uppermost layer of the uppermost aquifer;
- The background quality of other waters that may be affected;
- The underlying hydrogeologic conditions;
- Waste treatment and control measures;
- How treatment and control measures are justified as best practicable treatment and control;
- The extent to which the discharge will impact the quality of each aquifer; and

- The expected degree of degradation below water quality objectives.

In allowing a discharge, the Regional Water Board must comply with CWC Section 13263 in setting appropriate conditions. The Regional Water Board is required, relative to the groundwater that may be affected by the discharge, to implement the Basin Plan and consider the beneficial uses to be protected along with the water quality objectives essential for that purpose. The Regional Water Board need not authorize the full utilization of the waste assimilation capacity of the groundwater (CWC 13263(b)) and must consider other waste discharges and factors that affect that capacity.

Certain domestic wastewater constituents are not fully amenable to waste treatment and control and it is reasonable to expect some impact on groundwater. Some degradation for certain constituents is consistent with maximum benefit to the people of California because the technology, energy, water recycling, and waste management advantages of municipal utility service to the State far outweigh the environmental impact of a community that would otherwise be reliant on numerous concentrated individual wastewater systems. Economic prosperity of local communities is of maximum benefit to the people of California, and therefore sufficient reason to accommodate wastewater discharge provided terms of reasonable degradation are defined and met. The proposed Order authorizes some degradation consistent with the maximum benefit to the People of the State but does not authorize pollution (i.e., violation of any water quality objective).

Groundwater monitoring has been conducted around the facility; however, additional background groundwater quality data are needed, and therefore staff is unable to establish the most appropriate groundwater limits. In addition, certain aspects of wastewater treatment and control practices may not be justified as representative of Best Practicable Treatment and Control (BPTC). Reasonable time is necessary to gather specific information about the WWTP to make informed, appropriate, long-term decisions. This Order, therefore, establishes interim groundwater limitations to assure protection of beneficial uses of groundwater of the State pending the completion of certain tasks and provides time schedules to complete those tasks. During this period, degradation may occur from certain constituents, but cannot exceed water quality objectives (or natural background water quality should it exceed objectives) or cause nuisance.

According to the Basin Plan, water quality objectives define the least stringent limits that could apply as water quality limitations for groundwater at this location, except where natural background quality unaffected by the discharge of waste already exceeds the objective. The interim groundwater limits below apply numeric and narrative water quality objectives that must be met to maintain specific beneficial uses of groundwater. The constituents listed are those that are expected to be found in treated domestic wastewater or to be released from the soil upon the application of such waste. The *Policy for Application of Water Quality Objectives* in Chapter IV of the Basin Plan provides a mechanism to apply narrative objectives using relevant and appropriate numeric limits published by other agencies and organizations. Due to the expected high quality of natural background groundwater in the location of the discharge, numeric limits were selected so as to require that conditions of

nuisance, adverse tastes and odors, toxicity, or impact to sensitive agricultural uses would not be expected to occur. For the same reason, where incorporated drinking water MCLs are expressed as ranges, limits were selected that represent no impact on the municipal or domestic supply beneficial use. Unless natural background for a constituent proves to be higher, the groundwater quality limit established in proposed Order is the most stringent of the values for the listed constituents. Once the discharger provides information on background water quality and best practicable treatment or control, the groundwater limits may need to be adjusted (see *Reopener* below).

<u>Constituent</u>	<u>Units</u>	<u>Limit</u>	<u>Beneficial Use</u>	<u>Water Quality</u>	<u>Criteria or Justification</u>
Ammonia	mg/L	1.5	MUN ¹	Tastes and Odors	Odor Threshold ²
Boron	mg/L	0.7	AGR ³	Chemical Constituents	Protect sensitive crops ⁴
	mg/L	1.0	MUN ¹	Toxicity	Calif. Drinking Water Notification Level based on toxicity ¹¹
Chloride	mg/L	106	AGR ³	Chemical Constituents	Protect sensitive crops irrigated via sprinklers ⁴
		142	AGR ³	Chemical Constituents	Protect sensitive crops ⁴
		250	MUN ¹	Chemical Constituents	Recommended Secondary MCL ⁵
		500	MUN ¹	Chemical Constituents	Upper Secondary MCL ⁵
Iron	mg/L	0.3	MUN ¹	Chemical Constituents	Secondary MCL ⁶
Manganese	mg/L	0.05	MUN ¹	Chemical Constituents	Secondary MCL ⁶
Nitrate plus Nitrite as N	mg/L	10	MUN ¹	Chemical Constituents	Primary MCL ⁷
Nitrite as N	mg/L	1	MUN ¹	Chemical Constituents	Primary MCL ⁷
Sodium	mg/L	69	AGR ³	Chemical Constituents	Protect sensitive crops ⁴
Total Dissolved Solids	mg/L	450 ⁸	AGR ³	Chemical Constituents	Protect sensitive crops ⁴
		500	MUN ¹	Chemical Constituents	Recommended Secondary MCL ⁵
		1,000	MUN ¹	Chemical Constituents	Upper Secondary MCL ⁵
Total Coliform Organisms	MPN/100 ml	<2.2	MUN ¹	Bacteria	Basin Plan and non-detect MCL ⁸
Trihalomethanes	ug/L	80	MUN ¹	Chemical Constituents	
Bromoform	ug/L	4	MUN ¹	Toxicity	USEPA IRIS Cancer Risk Level ⁹
Bromodichloromethane	ug/L	0.27	MUN ¹	Toxicity	Cal/EPA Cancer Potency Factor ¹²
Chloroform	ug/L	1.1	MUN ¹	Toxicity	Cal/EPA Cancer Potency Factor ¹²
Dibromochloromethane	ug/L	0.37	MUN ¹	Toxicity	Cal/EPA Cancer Potency Factor ¹²

<u>Constituent</u>	<u>Units</u>	<u>Limit</u>	<u>Beneficial Use</u>	<u>Water Quality</u>	<u>Criteria or Justification</u>
PH	PH Units	6.5 to 8.5	MUN ¹	Chemical Constituents	Secondary MCL ¹⁰
		6.5 to 8.4	AGR ³	Chemical Constituents	Protect sensitive crops ⁴

- 1 Municipal and domestic supply
- 2 J.E. Amooore and E. Hautala, *Odor as an Aid to Chemical Safety: Odor Thresholds Compared with Threshold Limit Values and Volatilities for 214 Industrial Chemicals in Air and Water Dilution*, Journal of Applied Toxicology, Vol. 3, No. 6 (1983).
- 3 Agricultural supply
- 4 Ayers, R. S. and D. W. Westcot, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations – Irrigation and Drainage Paper No. 29, Rev. 1, Rome (1985)
- 5 Title 22, California Code of Regulations (CCR), Section 64449, Table 64449-B which is incorporated by reference into the Basin Plan.
- 6 Title 22, CCR, Section 64449, Table 64449-A which is incorporated by reference into the Basin Plan.
- 7 Title 22, CCR, Section 64431, Table 64431-A which is incorporated by reference into the Basin Plan.
- 8 Title 22, CCR, Section 64439, which applies the narrative objective to fully protect the cited beneficial use.
- 9 USEPA Integrated Risk Information System, <http://www.epa.gov/iris>.
- 10 Title 40, Code of Federal Regulations, Section 143.3, which applies the narrative objective to fully protect the cited beneficial use.
- 11 California Department of Public Health, Division of Drinking Water and Environmental Management, Drinking Water Notification Levels, <http://www.cdph.ca.gov/programs/pages/ddwem.aspx>.
- 12 CAL/EPA Toxicity Criteria Database (OEHHHA), <http://www.oehha.org/risk/ChemicalDB>.

Domestic wastewater contains numerous dissolved organic and inorganic constituents that together comprise Total Dissolved Solids (TDS). Each component constituent is not individually critical to any beneficial use. Critical constituents are individually listed. The cumulative impact from the other constituents, along with the cumulative affect of the constituents that are individually listed can be effectively controlled using TDS as a generic indicator parameter. The relevant numerical water quality limit for salinity is 450 mg/L, and is used through Basin Plan procedures to apply the narrative Chemical Constituents water quality objective for the protection of agricultural supply, the beneficial use most sensitive to TDS. This limit assumes no impact on sensitive agricultural uses, consistent with the high quality of expected natural background water quality in the area of the discharge. Most individual salt components can safely be assumed to be proportionately low such that TDS can be an effective indicator parameter in their regulation.

Not all TDS constituents pass through the treatment process and soil profile in the same manner or rate. Chloride tends to pass through both rapidly to groundwater. As chloride concentrations in most groundwaters in the region are much lower than in treated municipal wastewater, chloride is a useful indicator parameter for evaluating the extent to which effluent reaches groundwater. Boron is another TDS constituent that may occur in wastewater in concentrations greater than groundwater depending on the source water and the extent residents use cleaning products containing boron. Other indicator constituents for monitoring for groundwater degradation due to recharged effluent include total coliform bacteria, ammonia and total nitrogen, and Total Trihalomethanes (TTHMs), a by-product of chlorination.

Treatment Technology and Control

Given the character of domestic wastewater, secondary treatment technology is generally sufficient to control degradation of groundwater from decomposable organic constituents. Adding disinfection significantly reduces populations of pathogenic organisms, and reasonable soil infiltration rates and unsaturated soils can reduce them further. Neither organics nor total coliform organisms, the indicator parameter for pathogenic organisms, should be found in groundwater beneath a facility that is well-sited, well-designed, and well-operated. The bacteria objective in the Basin Plan, cited as a groundwater limitation in the order, is equivalent to requiring that coliform organisms not be detected in groundwater.

Domestic wastewater typically contains nitrogen in concentrations greater than water quality objectives, which vary according to the form of nitrogen. Groundwater degradation by nitrogen can be controlled by an appropriate secondary treatment system (e.g., oxidation ditch), tertiary treatment with nitrogen reduction, and agronomic reuse crops that are harvested and removed from the land application area. The effectiveness varies, but generally best practicable treatment and control is able to control nitrogen degradation of groundwater at a concentration well below the water quality objectives. The proposed interim limitation reflects water quality objectives.

Dissolved solids can pass through the treatment process and soil profile; effective control of such constituents relies primarily upon source control and pretreatment measures. In the best of circumstances, long-term land discharge of treated wastewater will degrade groundwater with dissolved solids (as measured by TDS and EC). The quality of source water for the Berryessa Estates Subdivision is fairly good, with a TDS of approximately 240 mg/L. Salt addition through use higher than the expected range, as effluent reveals a TDS of approximately 620 mg/L. For comparison, the national average increment for TDS ranges from 100 to 300 mg/L, according to *Wastewater Engineering* by Metcalf & Eddy; the incremental maximum in the Basin Plan for the Tulare Lake Basin is 500 umhos/cm (about 300 mg/L); and the incremental average standard allowed in the Santa Ana Basin is 230 mg/L. The proposed Order sets for interim effluent limits at the current discharge concentration, while requiring the development of salinity reduction BPTC measures. The proposed Order also sets interim groundwater limitations equivalent to water quality objectives, while site-specific, constituent-specific limits are developed in conjunction with a BPTC evaluation of source control and pretreatment.

Other constituents in domestic wastewater that may pass through the treatment process and the soil profile include recalcitrant organic compounds, radionuclides, and pharmaceuticals. Hazardous compounds are not usually associated with domestic wastewater and when present are reduced in the discharge to inconsequential concentrations through dilution and treatment. It is inappropriate to allow degradation of groundwater with such constituents, so proposed limits are nondetectable concentrations.

A discharge of treated wastewater water that overloads soils with nutrients and organics can result in anaerobic conditions in the soil profile, which in turn creates organic acids and decreases soil pH. Under conditions of low soil pH (below 5), iron and manganese

compounds in the soil can solubilize and leach into groundwater. Overloading the land application areas is preventable. Though iron and manganese limits are set at their respective water quality objectives, groundwater pH is expected to remain the same as background.

Title 27

Title 27, CCR, Section 20005 et seq. ("Title 27"), contains regulations to address certain discharges to land. Title 27 establishes a waste classification system, specifies siting and construction standards for containment of classified waste, requires extensive monitoring of groundwater and the unsaturated zone for any indication of failure of containment, and specifies closure and post-closure maintenance requirements. Generally, no degradation of groundwater quality by any waste constituent is acceptable under Title 27 regulations.

Discharges of domestic sewage and treated wastewater can be treated and controlled to a degree that will not result in unreasonable degradation of groundwater. For this reason, they have been conditionally exempted from Title 27. Discharges of domestic sewage and treated effluent which are regulated by WDRs and treatment and storage facilities associated with the WWTP are considered exempt from Title 27 under Section 20090(a), provided that the discharges and facilities will not result in a violation of any water quality objective. As the exemption specifically excludes the discharge to land of: 1) solid waste such as grit and screenings that result from treatment of domestic sewage, and 2) residual sludge that will not be further treated at the WWTP, such discharges must comply with provisions of Title 27.

The discharge of treated wastewater and the operation of treatment and/or storage facilities associated with a wastewater treatment plant can be allowed without requiring compliance with Title 27 only if groundwater degradation complies with the Basin Plan, Resolution No. 68-16 (Antidegradation Policy), and does not violate any water quality objectives.

Proposed Order Terms and Conditions

Discharge Prohibitions and Specifications

The Order requires the Discharger to submit technical reports that discusses the following: (a) completed installation of a SCADA system and high-level remotely operated alarms at the lift stations, (b) measures that will be taken to ensure continuous compliance with the Total Coliform Organisms Effluent limitations in the Order, (c) measures taken to ensure that the dissolved oxygen content of greater than 1.0 mg/L will be met at all times in the upper one-foot of any wastewater pond, (d) measures taken to ensure that the dissolved oxygen content in the ponds is greater than 1.0 mg/L, and (e) potential sources of the elevated TDS concentrations in Monitoring Well No. 5.

This Order also requires the Discharger to submit (a) a Salinity Evaluation and Minimization Plan to address sources of salinity to the wastewater treatment system, (b) a Background Groundwater Quality Study Report, (c) documentation showing that the water treatment plant

is in compliance with applicable California Department of Public Health requirements, (d) a revised Sludge Management Plan, and (e) a BPTC Evaluation Workplan.

In addition, this Order requires the Discharger to submit a single or multiple *As-Built Report(s)* certifying the completed installation of the land application areas totaling six acres, including a flow meter on the outlet of Pond No. 7, as described in the Findings of this Order and in compliance with the land discharge specifications.

Finally, this Order requires that at least 60 days before requesting an increase in the average dry weather wastewater inflow into the WWTP up to 67,000 gpd, the Discharger shall submit a technical report and water balance that justifies the proposed increase. Upon approval by the Executive Officer of technical report, the monthly dry weather inflow to the WWTP may increase up to 67,000 gpd.

This Order allows the monthly average dry weather inflow rate to the WWTP to increase based on submittal, and approval by the Executive Officer, of a technical report and water balance that justifies the proposed increase.

This Order's Effluent Limitations for BOD₅, total nitrogen, and TDS are based on information provided in the RWD. The discharge specifications regarding dissolved oxygen and freeboard are consistent with Regional Water Board policy for the prevention of nuisance conditions and overtopping, and are applied to all such facilities.

Monitoring Requirements

Section 13267 of the CWC authorizes the Regional Water Board to require monitoring and technical reports as necessary to investigate the impact of a waste discharge on waters of the state. In recent years there has been increased emphasis on obtaining all necessary information, assuring the information is timely as well as representative and accurate, and thereby improving accountability of any discharger for meeting the conditions of discharge. Section 13268 of the CWC authorizes assessment civil administrative liability where appropriate.

The proposed Order includes monitoring influent wastewater, treated effluent, wastewater treatment and storage ponds, land application areas, groundwater, and water supply. The Title 27 zero leakage protection strategy relies heavily on extensive groundwater monitoring to increase a discharger's awareness of, and accountability for, compliance with the prescriptive and performance standards. Title 27 regulations pertaining to groundwater monitoring and the detection and characterization of waste constituents in groundwater have been in effect and successfully implemented for many years. No regulation currently specifies similar criteria more suitable for a situation where extensive land application of treated wastewater occurs. It is appropriate that the Title 27 groundwater monitoring procedures be extended and applied on a case-by-case basis under Water Code Section 13267.

The Discharger must monitor groundwater for wastewater constituents expected to be present in the discharge, and capable of reaching groundwater, and violating groundwater limitations if its treatment, control, and environmental attenuation, proves inadequate.

For each constituent listed in the Groundwater Limitations section, the Discharger must, as part of each monitoring event, compare concentrations of constituents found in each monitoring well (or similar type of groundwater monitoring device) to the background concentration or to prescribed numerical limitations to determine compliance.

Reopener

The conditions of discharge in the proposed Order were developed based on currently available technical information and applicable water quality laws, regulations, policies, and plans, and are intended to assure conformance with them. However, information is presently insufficient to develop final groundwater limitations, so the proposed Order contains interim groundwater limitations. Additional information must be developed and documented by the Discharger as required by schedules set forth in the proposed Order. As this additional information is obtained, decisions will be made concerning the best means of assuring the highest water quality at reasonable cost. It may be appropriate to reopen the Order if applicable laws and regulations change, but the mere possibility that such laws and regulations may change is not sufficient basis for reopening the Order. The CWC requires that waste discharge requirements implement all applicable requirements.

REVISED

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